lower infantile mortality. The Jews present a much more rapid increase of numbers than either of the other two religious bodies, for, although their natality is less than either, their mortality is remarkably low for all ages, these conditions being probably due to their dietetic and hygienic regulations, the infrequent occupation of women out of their homes, early marriages, and general sobriety.

SOCIETIES AND ACADEMIES

EDINBURGH

Royal Society, July 2.—The Astronomer-Royal for Scotland communicated a paper, which was read by Prof. Crum Brown, on the group *b* in the solar spectrum, as observed with the remarkably fine spectroscope which Prof. Tait had recently secured for the University. The main conclusion come to was that the speculations regarding the existence of *basic* lines were unwarrantable, since the lines b^3 and b^4 were both distinctly double lines, each real single line in all probability being due to one of the substances, magnesium, iron, or nickel. The paper gave a complete historical statement of the observations of the *b* group by Swan, Ångström, Thalén, Young, and others, since the year 1830.—Prof. C. G. Knott read a paper on superposed magnetisms in iron and nickel. The experiments were, in part, a repetition of Wiedemann's well-known investigations into the twisting of iron wire under the influence of longitudinal and circular magnetisations. With a steady current along the wire, and a varying current in a helix round the wire, a twist was obtained which in almost every case reached a maximum for an intermediate value of the helical current. The maximum occurred sooner when the longitudinal current was diminished. No such maximum was obtained in the case of nickel, which twisted more and more for greater and greater currents, until the point of magnetic saturation was reached. Again the nickel twisted in the opposite direction to iron, other things being the same—a result in accordance with Barrett's observation that nickel *contracts* when magnetised, while, as Joule first proved, iron extends. The effect of weighting the wires so as to subject them to different tensions, was also investigated, the general result being that the twist was greater for the smaller weight, except for special combinations of current strengths and weights. —Prof. Tait gave further results as to the lowering of the maximum density point of water under increased pressure. By an improved method he estimated the lowering to be 2°·7 C. for one ton's weight per square inch, a result in wonderful agreement with that obtained by the indirect method carried out by Professors Marshall and Smith and Mr. Omond.—In a note on surface emissivities, Prof. Tait drew attention to the apparent lack of data on this subject, which, however, could be largely supplied from the numerous observations by Prof. Forbes and himself on the rate of cooling of the bars used in the conduction of heat experiments.—Prof. Tait also submitted to the Society a photograph of the markings on the arm of the boy who had been struck by lightning at Duns some weeks ago.

PARIS

Academy of Sciences, July 9.—M. Blanchard, president, in the chair.—On the pyroelectricity in blende, chlorate of sodium, and borazite, by MM. C. Friedel and J. Curie.—On the separation of gallium from tellurium and silicium, by M. Lecoq de Boisbaudran.—Observations on M. Hirn's recently published work on "The Phenomena due to the Action of the Atmosphere on Falling Stars, Aërolites, and other Meteoric Objects," by M. Daubrée. In this work the author argues that the apparition of all kinds of meteors in space, their luminosity and explosion, and accompanying sounds depend directly and exclusively on their velocity. This general conclusion is questioned by M. Daubrée, who points out that account must also be taken of the chemical action produced at contact of meteoric substances with the atmosphere.—On the infra-red spectra emitted by metallic vapours, by M. Henry Becquerel. The metallic vapours here dealt with are those of sodium, magnesium, calcium, potassium, silver, and thallium. The method of analysis described by the author opens a new and wide field of observation, comprising between the wave-lengths 760 and 1300 an interval of wave-lengths greater than that existing between the extreme red of the visible spectrum and the last-known ultra-violet rays.—Researches on the destruction and utilisation of the bodies of animals that have died of contagious diseases, and especially carbon poison, by M. Aimé Girard. The method here proposed consists in dissolving the carcasses at a low temperature in concentrated sulphuric acid, and then utilising the liquid thus obtained in the production of a superphosphate of azotic lime.—A protest is presented to the Academy on MM. Delattre's recent paper (meeting of May 21) on the treatment of the waters used in woolwashing. MM. Gaillet and Huet claim to be the real authors of the process, and support their claim by sundry documents. — On the conditions of the subsoil under the Berlin Observatory; letter addressed to M. Faye by M. Foerster.—On a method capable of furnishing an approximate value for the integral $\int_{-\infty}^{+\infty} F(x)\,dx$, by M. G. Gourier.—Generalisation of the theorem of Jacobi on the partial determinants of the adjunct system, by M. Em. Barbier.—On the reduction of equations, by M. A. E. Pellet.—On a lever, a new system of Roman balance with automatic slider, by M. A. Picart.—General formulas of centred dioptric systems, by M. Monoyer.—A new method of determining the limits of electrolysis, by M. Ch. Truchot.—On samarium, by M. P. T. Clève.—On the blue colour obtained by the action of chromic acid on oxygenated water, by M. H. Moissan.—On tetric acid and its homologues, by M. W. Pawlow.—On the dimorphism of iodide of silver, by MM. Mallard and Le Chatelier.—On some new characteristic reactions of salts of gold, by M. Ad. Carnot.—On the alcoholates of soda, by M. de Forcrand.—On the pyrogenation of colophany, by M. Ad. Renard. —Researches on the curve of muscular shocks in various maladies of the nervo-muscular system, by M. Maurice Mendelssohn. —Development and structure of tuberculous begonias, by M. Henri Duchartre.—Contributions to the study of the fermentation of breadstuffs, by M. L. Boutroux.—The microbes of the lymph of marine fishes, by MM. L. Olivier and Ch. Richet. The presence of parasites is clearly determined, and the authors conclude that microbes are nearly always present in the lymph, and consequently in the very tissues of the marine fishes.— Method of determining the quality of the wines of the south of France, by M. A. Audoynaud.

BERLIN

Physical Society, June 8.—Dr. Martius discussed the two recently-discovered instruments which are employed for the measurement of small frequently-occurring variations of a current, the telephone and the capillary electrometer. The latter, as is well known, was constructed about ten years ago by Mr. Lippmann in the laboratory of Herrn Kirchhoff, and is based on the principle that a current passing through a meniscus changes its surface tension, and causes a movement of the meniscus. The frequent variations of weak currents are indicated with difficulty, if at all, by galvanometers and tangent compasses, but the capillary electrometer can make such variations, especially as they occur in electrophysiology, visible to the eye. It has therefore quite latterly been employed in physiological experiments, and Dr. Martius has undertaken to investigate the capabilities of the apparatus in the form designed by Prof. Christiani, and described below. A glass tube drawn out at one end to a capillary, and partly filled with mercury, stands vertically in a large glass vessel also containing some mercury, and above it dilute sulphuric acid, in which the capillary point of the tube dips, so that the acid passes into the tube and up to the mercury meniscus. The position of the latter is read with a microscope. Metal wires are dipped into the mass of mercury, and a current can then be sent through the capillary tube, the current causing a motion of the mercury meniscus either upwards or downwards according to its direction, on a positive current flowing downward from the mercury in the tube moving the meniscus downwards, a negative current, upwards. In this apparatus care must be taken to keep the current too weak to cause electrolysis of the acid; otherwise the instrument becomes useless and must be refilled. The observations were first made with a constant current which was interrupted at will, and they showed that under exactly similar conditions the displacement which a positive current produced were always greater than those caused by a negative current of like strength. On making and breaking contact rapidly, for instance about twelve times a second, a total displacement of the mercury, corresponding to the direction of the current, was observed, and also oscillations of the meniscus, the number of which was equal to the number of interruptions of the current. If the number of interruptions was increased, a stronger current had always to be used in order to make the

oscillations of the meniscus perfectly visible, weaker currents causing a total displacement of the mercury corresponding to the strength of the current, while the oscillations of the meniscus appeared only as a broad undefined rim. Dr. Martius then investigated the action of induced alternating currents, the behaviour of which was much more complicated inasmuch as, with equal intensity of the primary current and equal distances of the induction coils from one another, the four following different cases are to be observed: (1) The current on breaking contact passes through the mercury meniscus in a positive or anodic direction; (2) the current on making contact passes in a cathodic direction; (3) the current on breaking contact passes in a cathodic direction; (4) that on making contact passes in an anodic direction. All these four cases which group themselves in pairs in every experiment, affect the meniscus differently; for besides the difference of the anodic and cathodic current, already mentioned in the case of constant currents, the current on making contact under otherwise similar conditions was more effective than that on breaking contact, the action of the current on the instrument being, therefore, just the reverse of that on the nerves and muscles. The reason of this is that in the capillary electrometer the current on making contact produces a stronger polarisation than that on breaking contact, on account of its longer duration. The total effect which alternating induction currents produce on the capillary electrometer is the result of the individual effects of the current, and is certainly on this account very complicated, but it can be predicted acccording to the rules given above for every direction, strength, and frequency of the induction currents.—Prof. Kronecker demonstrated on a student the audibility of the muscle tone when the muscle was voluntarily contracted, by means of a pair of telephones. The telephones were connected with two needles, which the student placed in his biceps muscle, and the members of the Society convinced themselves that at every contraction of the muscle a deep soft breathing tone was heard.

Physiological Society, June 29.—Dr. Curt Lehmann explained two apparatus, which he had constructed with a view of maintaining artificial respiration in animals upon which other experiments are tried. The former method, which consists in blowing air into the lungs by means of a motor working in a certain rhythm, has the disadvantage that, in order to keep up the efficiency of the ventilation, the pressure must soon be increased, producing emphysema of the lungs, to which the animals succumb. Dr. Lehmann has obviated this by blowing air into some receptacle by means of the motor in question, and by letting it there be condensed to a certain moderate density (say 8 to 10 cm. of water). A second receptacle contains air in a corresponding degree of rarefaction. An indiarubber tube is tied into the trachea of the animal; this tube is forked at the other end, one branch communicating with the condensed the other with the rarefied air. An electric clock, which marks whatever intervals of time are required, is connected by means of a double lever with this tube, and alternately closes the one or the other of the branches. Thus air is either driven into the lung under a gentle pressure or is sucked out of it under the same pressure. In spite of the low pressure, the ventilation is perfect on account of the alternate driving in and sucking out of air; the lung of the animal is in no wise affected, and artificial respiration can thus be kept up without danger for eight hours. The second apparatus, which on the whole, after the same principle, connects the lung alternately with condensed and rarefied air, is constructed in a more complicated manner, as it contains bells for the collection of the respiration products, for the event that these may have to be examined. Both apparatus work automatically; the influence of the respiratory motion upon the blood pressure could be shown when they were used, just as easily as with animals respiring normally. The special experiments in which Dr. Lehmann used these apparatus referred to the influence of temperature upon the bacilli of Septicæmia. Developed in blood outside the body, the number of bacilli increased the more, under equal conditions otherwise, the higher the temperature, up to 43° C. With animals the experiments were made in such a way that in each series of experiments four rabbits were vaccinated with septicæmic bacilli. Of these No. 1 was kept at 42° C., No. 2 at ordinary room temperature, No. 3 strongly cooled by means of water (temperature 35° C. in the interior), and No. 4 poisoned with curare and cooled. No. 1 died first, although about two hours before its death but few bacilli were contained in the blood; soon afterwards No. 3 died, its blood containing many bacilli; a few hours later No. 2 succumbed, having attained the fever temperature of 42° C. much later than No. 1; the number of bacilli in its blood was moderate. No. 4 lived longest, although the number of bacilli in its blood was greatest.—A communication was then read concerning the important observations made by Prof. Pflüger (Bonn) regarding the division of frog's ova by a groove-formation after fertilisation. It is known that fertilised frog's ova turn over in such a way that their black hemisphere is turned upwards and the white one downwards, and that the axis passing through the centre symmetrically to both hemispheres is perpendicular. The normal grooving now begins with a division in a median plane passing through the axis; the second division is at right angles to the first, also passing through the axis; the third one takes place at right angles to the axis, somewhat nearer to the upper end. Prof. Pflüger prevented some fertilised frog ova from turning over by fastening them to glass, so that in the single ova the hemisphere axes pointed in the most varied directions; yet he found that the first division in *all* of them was always perpendicular, without any reference to the position of the axis; the second and third divisions of the ovum remaining in the same relative position with regard to the first anomalous division as if the ova had been in a normal position. The first traces of the groove of the back also invariably showed themselves on the upper side of the first division plane, thus frequently in the white hemisphere. But later on all the ova which were fastened at the bottom perished.

CONTENTS

ERRATUM.—On p. 264, col. 1, line 9, for *rabies* read *tabes*.